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Small Satellites: National Regulatory Challenges

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This article¹ analyses the regulation of space activities, especially small satellites activities. Its purpose is to analyse the relevant international legal framework and discuss the possible future national space legislation in Lithuania. It has been divided into two chapters. Chapter 1 summarises the relevant international space law and addresses essential aspects related to the authorisation of space activities, registration of objects launched into outer space, liability issues, insurance requirements and debris mitigation issues. Chapter 2 deals with reasons to adopt the national space legislation in Lithuania and discusses what legal aspects should be covered by the national law in order to guarantee balance between the regulation and promotion of small satellite activities. Finally, it includes the Model Law on the Promotion of National Space Activities and the Establishment of a National Space Registry of the Republic of Lithuania.

Keywords: national space law, international space law, small satellites, National Space Registry.

Mažieji palydovai: nacionalinio reguliavimo problemos

Šiame straipsnyje analizuojamas veiklos kosmose, o ypač veiklos, susijusios su mažaisiais palydovais, reglamentavimas. Jo tikslas yra išanalizuoti tarptautinius teisės aktus šioje srityje ir aptarti galimą veiklos kosmose reglamentavimą Lietuvoje. Straipsnis suskirstytas į du skyrius. Pirmame skyriuje pateikiama glausta atitinkamų tarptautinės teisės aktų apžvalga ir aptariami svarbiausi aspektai, susiję su veiklos kosmose autorizavimu, registracija, atsakomybe už kosmoso objektų sukeltą žalą, mažųjų palydovų veiklos draudimu ir kosmoso taršos mažinimu. Antrame skyriuje analizuojamas veiklos kosmose reglamentavimo Lietuvoje poreikis ir klausimai, į kuriuos derėtų atsižvelgti siekiant užtikrinti nacionalinio reglamentavimo ir mažųjų palydovų veiklos skatinimo pusiausvyrą. Be to, jame pateikiamas Lietuvos Respublikos įstatymo dėl nacionalinės veiklos kosmose skatinimo ir nacionalinio kosmoso objektų registro įsteigimo projektas.

Pagrindiniai žodžiai: tarptautinė kosmoso teisė, nacionalinė kosmoso teisė, mažieji palydovai, nacionalinis kosmoso objektų registras.

Introduction

In today's society space systems and technologies have become an important part of economic, scientific and security capabilities. As space systems are expensive, promoting small satellites activities, because of their reasonable costs, could be an attractive national space strategy for small countries.

¹ The views and opinions expressed in this article are those of the author and do not necessarily reflect the official position of the European Court of Justice.

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Small satellites offer valuable missions for technology demonstrations, training, education, as well as for many fields of science and application. Even they are not a solution for all sorts of missions, Earth observation, border surveillance, agriculture monitoring, aircraft tracking, climate monitoring, ship tracking, pipeline monitoring, scientific research using small satellites or small satellites communications constellations could be promising business models. There is no universally accepted definition of a small satellite. In 2005, The International Academy of Astronauts (IAA) Study Group proposed categories of small satellites based on their mass: *minisatellites* <1000 kg, *microsatellites* <100 kg, *nanosatellites* <10 kg, *picosatellites* <1 kg². These categories have been widely used in academia and practice³. The International Telecommunication Union (ITU) considers satellites with a mass of less than 500 kg *minisatellites* and take up the other categories proposed by the IAA. Satellites with a mass from 10 g to 100 g are called *femtosatellites*, with a mass from 1 g to 10 g – *attosatellites* and with a mass from 0.1 g until 1 g – *zeptosatellites*.

Being considered low-cost technology, small satellites are particularly important for countries emerging in space technology which already have a degree of technical knowledge and space experience. Lithuania is one of the “space emerging” countries. In the 20th century, Lithuanian scientists cooperated with the USSR in space activities. At the beginning of the 21st century cooperation between Lithuania and European Space Agency (ESA) started. In 2014 the first two Lithuanian scientific small satellites LitSat-1 and LituanicaSat-1 were launched into space. Currently, the Lithuanian space sector is composed of several research centres, research groups in universities and some companies developing high-quality small satellites and space technologies. Due to insufficient activities by non-governmental entities, until now Lithuania has not had any space legislation. However, history shows that a large national space industry develops only when substantial governmental assistance is conferred⁴. In addition, national space legislation is necessary in order to comply with international space treaties to which Lithuania is the State party. Implementing international space law by harmonising international obligations with national legislation – for example supervising the space activities of non – governmental entities and maintaining the register of Lithuanian space objects – would provide a state with an essential basis for enacting a national law that suits its unique national circumstances and needs⁵.

The object of this article is the regulation of space activities, especially small satellites activities. The purpose of the research is to analyse the relevant international legal framework and discuss the possible future national space legislation in Lithuania. To accommodate the research objective the doctrinal legal analysis is employed. The relevant primary sources and secondary sources are used in this article. The Outer Space Treaty, Registration Convention, Liability Convention and international legal instruments for space debris mitigation constitute the primary sources and are subjected to the analysis because of their direct implications for the small satellites missions. Secondary sources, such as journals or books, which fall within the research scope, are also examined. The article has been divided into two Chapters. Chapter 1 summarises the relevant international space law and addresses essential aspects related to the authorisation of space activities, registration of objects launched into

² Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites, Committee on the Peaceful Uses of Outer Space, 54th Session (2015): p. 2.

³ KOUDELKA, O. Micro/Nano/Picosatellite-Activities: Challenges towards Space Education and Utilisation. In *Small satellites: regulatory challenges and chances*. Marboe, I. (ed.). Leiden: Brill Nijhoff, 2016, p. 7.

⁴ SETSUKO, A. Current Status and Recent Developments in Japan's National Space Law and its Relevance to Pacific Rim Space Law and Activities. *Journal of Space Law*, 2009, Vol. 35, p. 366.

⁵ KOUL, R.; JAKHU, Ram S. Regulation of Space Activities in India. From *National Regulation of Space Activities*. Jakhu, Ram S. (ed.). Springer, 2010, p. 157.

outer space, liability issues, insurance requirements and debris mitigation issues. Chapter 2 deals with reasons to adopt the national space legislation in Lithuania and discusses what legal aspects should be covered by the national law in order to guarantee balance between the regulation of and promotion of small satellite activities. Finally, it includes the Model Law on the Promotion of National Space Activities and the Establishment of a National Space Registry of the Republic of Lithuania.

1. Relevant international legal framework⁶

1.1. Outer Space Treaty

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) was adopted by the UN General Assembly and entered into force on 10 October 1967. It represents the most fundamental and all-encompassing of all space treaties⁷. According to its Article VI, state parties bear international responsibility for the national activities in outer space carried on by governmental and non-governmental entities⁸. They also shall ensure that national space activities are carried out in conformity with the provisions of the Outer Space Treaty. All national space activities shall require authorisation and continuing supervision by the appropriate State Party⁹. States discharge this obligation by issuing authorisations for the space activities and imposing conditions on their conduct, which they will monitor¹⁰. Since the international obligation concerning space activities is not dependent on the size of the space objects, states have the obligation to authorise and supervise small satellites' activities as well¹¹. Each state party that is the launching state is internationally liable for damage to other state parties¹². The responsibility of the states for their national space activities is an essential incentive for the states to regulate the space activities of their nationals¹³. Under the Article VIII of the Outer Space Treaty, state parties on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object¹⁴.

1.2. Liability Convention

The liability provisions of the Outer Space Treaty are extended by the Convention on International Liability for Damage Caused by Space Objects (Liability Convention) which was adopted by the UN General Assembly entered into force on 1 September 1972. This Convention can be summarised as follows: a launching state shall be liable for all damage caused by its space object on the surface of the Earth, whereas a launching state shall be liable based on fault in cases where its space object causes damage elsewhere rather than the surface of the Earth¹⁵. Under the Outer Space Treaty there are four

⁶ Status of International Agreements relating to activities in outer space as at 1 January 2018.

⁷ von der DUNK, F. International space law. From *Handbook of space law*. von der Dunk, F.; Tronchetti, Fabio (eds.). Cheltenham: Edward Elgar Publishing, 2015, p. 29.

⁸ Article VI of the Outer Space Treaty.

⁹ Article VI of the Outer Space Treaty.

¹⁰ MOSTESHAR, S.; MARBOE, I. Authorisation of Small Satellites under National Space Legislation. In *Small satellites: regulatory challenges and chances*. Marboe, I. (ed.). Leiden: Brill Nijhoff, 2016, p. 131.

¹¹ MOSTESHAR, S.; MARBOE, I. Authorisation of Small Satellites <...>, p. 136.

¹² Article VII of the Outer Space Treaty.

¹³ MOSTESHAR, S.; MARBOE, I. Authorisation of Small Satellites <...>, p. 131.

¹⁴ Article VIII of the Outer Space Treaty.

¹⁵ LOUKAKIS, A. EU as Owner of Galileo Satellites: Consequences for Registration and Liability. In *Ownership of Satellites. 4th Luxembourg Workshop on Space and Satellite Communication Law*. Hofmann, M.; Loukakis, A. (eds.). Nomos, 2017, p. 122.

categories of launching state: 1) the state that launches 2) the state which procures the launching of a space object and each state from whose 3) territory or 4) facility an object is launched¹⁶. The Liability Convention reiterates these categories. There may be more than one launching state for the purposes of liability¹⁷. Even if a launch takes place from another state's territory, a state may still be exposed to liability if its activities fall within one of the four categories of launching state. The fact that a space object may be launched by one state on behalf of another does not take away any liability but results in liability being joint and several¹⁸. Under the Liability Convention, the liability of the launching state on the international level is neither limited in amount nor in time¹⁹. The victim of damage has the choice of the procedure: it may ask its own state to enter into the procedures provided by the Liability Convention, or it may use by itself the usual legal way to obtain satisfaction under domestic law before a domestic judge²⁰.

Under the Liability Convention, the definition of damage is a loss of life, personal injury or other impairment of health, loss of or damage to property or of persons, natural or juridical, or property of international intergovernmental organisations²¹. The damage is usually interpreted to mean actual physical damage rather than pecuniary interest or other forms of non-physical damage²².

International space law addresses the issue of liability for damages caused by space activities through the concept of an "object" being at the cause of such damage²³. The Liability Convention specifies that the "object" under Article VII of the Outer Space Treaty is a "space object" and defines it as including "component parts of a space object as well as its launch vehicle and parts thereof"²⁴. In the absence of any precise definition of "space object", it is not clear whether "space object" encompasses small space objects such as small satellites²⁵. The perception, that unguided or even uncontrollable small satellites are not real space objects is misguided. With the rapidly increasing numbers of small satellites operating in the lowest orbit the likelihood that such satellites may interfere with other satellites in a harmful manner is growing exponentially²⁶. The inclusion of component parts, which could be small, in the concept of "space objects" for the purpose of the Liability Convention shows, that outset size does not matter, and small satellites should be qualify as "space objects"²⁷. It should be mentioned, that even space debris by now has generally been accepted to qualify as "space objects" for the purpose of the Liability Convention²⁸.

As states are liable for activities in which they are considered the launching state, they should seek to limit risky launches that might cause damage to other states. Countries trying to foster space activities should put in place provisions to reduce their potential exposure to liability, such as requiring that

¹⁶ Article VII of the Outer Space Treaty.

¹⁷ JOHNSON, C. D. *Handbook for New Actors in Space*. The Secure World Foundation, 2017, p. 27.

¹⁸ KERREST de ROZAVEL, A.; von der DUNK, F. Liability in the context of national authorisation. In *National Space Legislation in Europe*. von der Dunk, F. (ed.). Leiden: Martinus Nijhoff Publishers, 2011, p. 126.

¹⁹ KERREST de ROZAVEL, A.; von der DUNK, F. Liability in the context <...>, p. 127.

²⁰ KERREST de ROZAVEL, A.; von der DUNK, F. Liability in the context <...>, p. 128.

²¹ Article I of the Liability Convention.

²² JOHNSON, C. D. *Handbook for New Actors in Space* <...>, p. 27.

²³ von der DUNK, F. Liability for damage caused by small satellites – A Non-issue?. From *Small satellites: regulatory challenges and chances*. Marboe, I. (ed.). Leiden: Brill Nijhoff, 2016, p. 154.

²⁴ Article I(d) of the Liability Convention.

²⁵ von der DUNK, F. Liability for damage caused by small satellites <...>, p. 158.

²⁶ von der DUNK, F. Liability for damage caused by small satellites <...>, p. 159.

²⁷ von der DUNK, F. Liability for damage caused by small satellites <...>, p. 158.

²⁸ von der DUNK, F. Liability for damage caused by small satellites <...>, p. 162.

new non-governmental entrants find insurance for their missions²⁹. There is no insurance obligation imposed by the Outer Space Treaty or the Liability Convention. Still, many states have developed a regime under which is required satisfactory evidence of adequate insurance or financial guarantee³⁰.

1.3. Registration Convention

The registration provisions of the Outer Space Treaty are extended by the Convention on Registration of Objects Launched into Outer Space (Registration Convention) which was adopted by the UN General Assembly and entered into force on 15 September 1976. Under the Article I of the Registration Convention, the “launching state” is a state launching or procuring the launching of a space object or a state from whose territory or facility a space object is launched. Under Article II of this Convention, the launching state shall register its space object in a national registry, which it shall maintain. If there is more than one launching state, they shall decide which will register the space object³¹. Only one state of registry should exist for a particular space object³². The State of registry determines the contents and conditions of the national register and informs the Secretary-General of the UN of the establishment of such a registry³³. Registration information submitted directly to the UN by private corporations, individuals, national agencies or academic institutions are not considered valid submissions. Only information provided through Diplomatic Missions accredited to the UN are considered valid submissions³⁴. At the time of writing, 39 Member States have informed the Secretary-General of the UN of the establishment of a national register of objects launched into outer space. The UN General Assembly resolution 68/74 stipulates that an appropriate national authority should maintain a national registry of objects launched into outer space³⁵. The national registries are not required to be publicly available³⁶.

The Secretary-General of the UN is required by the Article III of the Registration Convention to maintain a public registry of all the space objects registered in the national registries.

Article IV of the Registration Convention clarifies the type of information to be provided to the Secretary-General of the UN. States may provide additional information on space objects in orbit and should report when space objects are no longer in Earth orbit.

As the global space sector is growing significantly, every year more and more actors enter into the industry, and the number of demands for launching objects into space continues to grow. It is essential to have a system in place which records objects launched into space. The registration is vital for the reason of safety: other operators can avoid colliding with new satellites in orbit, new operators can safely plan to launch their space objects, and in case of accidents, to determine liability by identifying the space objects involved³⁷. The registration determines which state exercises jurisdiction and con-

²⁹ JOHNSON, C. D. *Handbook for New Actors in Space* <...>, p. 28.

³⁰ GOUBERT, C. Insurance in the context of space activities. In *Handbook of space law*. von der DUNK, F.; TRONCHETTI, F. (eds.). Cheltenham: Edward Elgar Publishing, 2015, p. 914.

³¹ Article II(2) of the Registration Convention.

³² Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites, Committee on the Peaceful Uses of Outer Space, 54th Session, 2015, p. 5.

³³ Article II(3) of the Registration Convention.

³⁴ Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites, Committee on the Peaceful Uses of Outer Space, 54th Session, 2015, p. 6.

³⁵ Recommendations on national legislation relevant to the peaceful exploration and use of outer space, UN General Assembly 51st Session, A/RES/68/74, 2013, para. 6.

³⁶ LARSEN, P. B. Small Satellite Legal Issues. *Journal of Air Law and Commerce*, 2017, Vol. 82, p. 290.

³⁷ Larsen, P. B. Small Satellite Legal Issues <...>, p. 289.

trol over a particular satellite³⁸. Articles I, II and III of the Registration Convention require to register small satellites because they are space objects³⁹. Since small satellites can be launched with low cost, many universities or non-governmental organisations are involved in small satellite activities. They often neglect to register small satellites because they think that they are insignificant and too small to be considered space objects⁴⁰. Regardless of failure to register, small satellites remain subject to international law requirements because registration of small satellites can be considered to be customary international law⁴¹.

At the moment there are two separate complementary registers of Objects Launched into Outer Space: “Resolution 1721 B (XVI) Register”⁴² and “Convention Register”⁴³. After the Registration Convention entered into force, Member States needed to provide information under this Convention instead of Resolution 1721 B (XVI). If the State is not the party to the Registration Convention, it can still provide registration information under Resolution 1721 B (XVI) on a voluntary basis. These two registers, on behalf of the Secretary-General of the UN, is maintained by the UN Office for Outer Space Affairs (UNOOSA).

The 2007 UN General Assembly resolution 62/101⁴⁴ is the most recent measure that concern registration of space objects. It based upon best practice of States in registering space objects. The purpose of this resolution is to improve and harmonise the registration process. It also expands upon the types of additional information on space objects in orbit to be provided under the article IV of the Registration Convention.

1.4. International legal instruments for space debris mitigation

The amount of space debris is continuously growing. According to the National Aeronautics and Space Administration (NASA), in 2005 the total mass of space debris in Earth orbit was about 5 000 tones. Today this number is approximately 8 000 tones. The space debris issue is not explicitly addressed in the UN space treaties. This gap is filled by some non-binding international standards on space debris mitigation. In addition, many states have adopted national laws on space debris.

In 2002 the Inter-Agency Space Debris Coordination Committee (IADC) adopted the Space Debris Mitigation Guidelines, which were revised in 2007. They are based on various existing national and international space debris mitigation practices. The IADC Space Debris Mitigation Guidelines are not binding and applicable to mission planning and the design and operation of spacecraft and orbital stages that will be injected into Earth orbit⁴⁵. Operators are encouraged to use the guidelines when establishing the mission requirements⁴⁶. They are also encouraged to apply them to ongoing missions⁴⁷. These guidelines focus on a limitation of debris released during normal operations, minimisation of the potential for on-orbit break-ups, post-mission disposal and prevention of on-orbit collisions⁴⁸. They were used as a basis for the development of the UN COPUOS Space Debris Mitigation Guidelines.

³⁸ Article VIII of the Outer Space Treaty.

³⁹ Articles I, II, III of the Registration Convention.

⁴⁰ Larsen, P. B. *Small Satellite Legal Issues* <...>, p. 289.

⁴¹ Larsen, P. B. *Small Satellite Legal Issues* <...>, p. 289.

⁴² Established under the Resolution 1721 B (XVI) (A/AC.105/INF/ series documents).

⁴³ Established under the Registration Convention (ST/SG/SER.E/ series documents).

⁴⁴ Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects, UN General Assembly 62nd Session, A/RES/62/101, 2007.

⁴⁵ Article 2 of the Space Debris Mitigation Guidelines.

⁴⁶ Article 2 of the Space Debris Mitigation Guidelines.

⁴⁷ Article 2 of the Space Debris Mitigation Guidelines.

⁴⁸ Article 1 of the Space Debris Mitigation Guidelines.

The UN General Assembly endorsed the Space Debris Mitigation Guidelines of the UN COPUOS in the Resolution 62/217 of 22 December 2007. They are not binding under public international law. The UN Member States are invited to implement them through national mechanisms. These guidelines reflect existing national and international practices. They apply to mission planning and the operation of newly designed spacecraft and also to existing ones, if possible⁴⁹. The Space Debris Mitigation Guidelines of the UN COPUOS focus on the limitation of debris released during normal operations, minimisation of the potential for break-ups during mission operation, prevention of accidental collisions in orbit, avoidance of international destruction, minimisation of the potential for post-mission break-ups resulting from stored energy, limitation of the long-term presence of spacecraft in the Low Earth Orbit (LEO) region after the end of mission and avoidance of long-term interference of satellite with the Geostationary Earth Orbit (GSO) region after the end of mission⁵⁰. These guidelines are based on the basic definitions and technical content of the IADC Space Debris Mitigation Guidelines. They take into consideration the UN treaties and principles on outer space.

The European Code of Conduct for Space Debris Mitigation adopted in 2004, Requirements on Space Debris Mitigation for ESA Projects adopted in 2014 and ISO 24113:2011 Space Systems – Space Debris Mitigation Requirements published in 2010 and revised in 2011 also should be mentioned. These not legally binding international documents are in line with guidelines listed above.

2. National space legislation: recommendations for Lithuania

In 2013 the UN General Assembly adopted Resolution 68/74 “Recommendation on national legislation relevant to the peaceful exploration and use of outer space”. This resolution provides elements for consideration by States when enacting the national legal framework for national space activities. Resolution 68/74 invites the member states to establish national regulatory frameworks which include aspects related with the launch of objects into and their return from outer space, the operation and control of space objects in orbit, exploration activities and the application of space science and technology, authorization procedure for the authorization of space activities, national registry of objects launched into outer space, liability issues and insurance requirements. Under this resolution, space activities should require authorisation by a competent national authority which should be set out explicitly⁵¹. States might employ specific procedures for the authorisation. The conditions and procedures for granting, suspending, modifying or revoking the authorisation should be clear and consistent with the international obligations of the state⁵². The conditions for authorisation should help to guarantee that space activities are carried out safely and to minimise risks to persons, and the property or environment and that national space activity does not lead to harmful interference with other space activities⁵³. Appropriate procedures should ensure the monitoring of authorised space activities⁵⁴. The enforcement mechanisms could include administrative measures such as penalties, the suspension or revocation of the authorisation⁵⁵.

⁴⁹ Article 3 of the Space Debris Mitigation Guidelines.

⁵⁰ Article 4 of the Space Debris Mitigation Guidelines.

⁵¹ paragraph 3 of the Resolution 68/74.

⁵² paragraph 3 of the Resolution 68/74.

⁵³ paragraph 4 of the Resolution 68/74.

⁵⁴ paragraph 5 of the Resolution 68/74.

⁵⁵ paragraph 5 of the Resolution 68/74.

Some of the Lithuanian non-governmental companies already have experience and participate in space industry, especially in small satellites industry. According to Article VI of the Outer Space Treaty, Lithuania is responsible for its national space activities in outer space and shall authorise and supervise them. Following the practices in Europe and the UN General Assembly Resolution 68/74 “Recommendations on national legislation relevant to the peaceful exploration and use of outer space”, Lithuania should enact the national legislation guaranteeing balance between the regulation of and promotion of national space activities, including small satellite activities. It should cover the following aspects:

- Both governmental and non-governmental space activities should require authorisation by a competent national authority. This function could be fulfilled by the Department of Innovations of the Lithuanian Ministry of Economy, which is responsible for the space policy developments in Lithuania.
- The conditions for granting the authorisation should be explicitly set out. These conditions should help to guaranty that:
 - space activities are consistent with the international obligation of Lithuania and reflect the national security and foreign policy interests of the country;
 - space activities do not pose a threat to persons, the property and environment, the public order and public health;
 - space activities do not lead to harmful interference with other space activities;
 - operators possess the experience, expertise, technical qualifications and capability to carry out space activities, and to end them;
 - operators have adopted measures for the prevention of space debris;
 - operators have a frequency licence;
 - operators have taken out insurance. In order to promote national space activities, the State should exempt some space activities from the insurance requirement or reduce insurance sum.
- The same conditions should apply to changing the operator.
- The State might employ appropriate procedures for monitoring and continuing supervision of authorised space activities.
- The authorisation is to be revoked if the conditions for the authorisation of space activities are no longer met, or if the authorisation has been obtained based on false statements or irregular means.
- The undertaking of space activity without authorisation is to be fined.
- A model of the application form should be electronic, free of charge and accessible on the webpage of the competent authority.
- Any decision on an authorisation application should be taken no later than six months after having received it.
- A reasonable fee for administrative services offered in the context of the authorisation process can be charged.

Even if space debris mitigation issue is not addressed in the UN space treaties to which Lithuania is the State party, Lithuania should enact national space legislation in line with non-binding international standards on space debris mitigation. In accordance with the IADC Space Debris Mitigation Guidelines, the Space Debris Mitigation Guidelines of the UN COPUOS, the Requirements on Space Debris Mitigation for ESA Projects and other internationally recognised documents, Lithuania should create a national space debris mitigation mechanism. Under such a mechanism, taking measures limiting space debris released during normal operation should be one of the conditions for authorisation of space activities.

As a party to the Registration Convention Lithuania shall establish an appropriate registry and inform the UN Secretary-General of the establishment of such a registry. Following the practices in Europe, especially in Austria or the Netherlands, and in accordance with UN General Assembly Resolution 62/101 and Resolution 68/74, Lithuania shall adopt the legislation establishing the national space registry. The national legislation should cover the following aspects:

- A national registry of objects launched into outer space should be maintained by an appropriate national authority. This function could be fulfilled by the Department of Innovations at the Lithuanian Ministry of Economy, which is responsible for space policy developments in Lithuania.
- Operators of space objects whose activities in outer space Lithuania is considered to be responsible for should be requested to submit the relevant information to this authority.
- The following information should be entered in the national registry: the name of the launching state, designation of the space object, registration number of the space object and the ITU frequency allocation number; the date and location of launch; basic orbital parameters; geostationary orbit location (where appropriate); information about the function of the space object; any change of status in operations (when a space object is no longer functional); the approximate date of decay or re-entry; the date and physical conditions of moving a space object to a disposal orbit; web links to official information on space objects; the date of change in supervision; the identification of the new owner or operator; any change in orbital position; any change in function of the space object.
- The Department of Innovations of the Lithuanian Ministry of Economy should be responsible for furnishing the relevant information to the UN Secretary-General.
- The entry in the registry should be for an indefinite period.
- The registry should be public.
- A model of the application form should be electronic, free of charge and accessible on the webpage of the competent authority.
- A reasonable fee for administrative services offered in the context of the authorisation process can be charged.

Lithuania is the State party to the Outer Space Treaty and the Liability Convention, and thus as a launching state, it shall be internationally liable for the damages caused by its space objects. Following the UN General Assembly Resolution 68/74 “Recommendations on national legislation relevant to the peaceful exploration and use of outer space”, Lithuania should adopt the national space legislation considering the ways to seek recourse from operators of space objects if its liability for damages under the UN treaties on outer space has become engaged. To ensure coverage for damage claims the third-party liability insurance requirement as a condition for granting the authorisation of space activities could be introduced. By introducing the insurance requirement, the following aspects should be considered:

- As the term “space activity” is not specified in the international treaties, its definition should be provided for by the national space legislation. It could cover the launch, operation and control of the space objects.
- The clear definition of the “space object” is needed.
- For example, in Austria, the mandatory third-party liability insurance is set at 60 000 000 EUR, in the Netherlands – 20 000 000 EUR. In the case of the low-cost small satellites operators, these additional costs can be very significant for the financial management of the mission. In order to encourage the commercial space activities, the national space legislation should include a possible waiver on insurance requirements or special treatment to small satellites.
- The exemption or lowering of the amount in consideration should be based on risk evaluation of the space activity. The on-orbit risk for the active small satellites is considered quite low by the

insurers⁵⁶. The risk of damage caused following re-entry of small satellites is considered by the insurers quite low as well because most of the time the satellite will burn up entirely when re-entering into the atmosphere⁵⁷.

- The competent authority - the Department of Innovations of the Lithuanian Ministry of Economy which is responsible for the space policy developments in Lithuania - should be given the competence to take a decision whether small satellites should be released from the insurance requirements or whether the amount in consideration should be lower.
- If space activities are in the public interest (serving education, research or science), they should be exempted from the insurance requirements.
- If Lithuania itself acts as the operator, insurance requirements should not be prescribed.

In the light of all the foregoing considerations, the following model law for Lithuanian space legislation is hereby proposed:

Model Law on the Promotion of National Space Activities and the Establishment of a National Space Registry of the Republic of Lithuania (Lithuanian Space Activities Act)
is hereby proposed.

CHAPTER I. GENERAL PROVISIONS

Article 1. Purpose

The main purpose of this Law is to promote the peaceful use and scientific exploration of outer space, to ensure national security, to boost the growth of the national economy, and to raise the national standard of living through the effective use and management of space objects and the systematic promotion of national space activities.

Article 2. Scope of application

(1) This Law may be called the Lithuanian Space Activities Act.

(2) It applies to space activities carried out by a natural person with citizenship of the Republic of Lithuania or juridical person seated in the Republic of Lithuania on or the territory of the Republic of Lithuania or on or from ships or aircrafts registered in the Republic of Lithuania.

Article 3. Definitions

(1) In this Law and in any rules made thereunder, unless the context otherwise requires:

- (a) “space activity” means the launch, operation or control of a space object;
- (b) “space object” means any object launched or destined to be launched into outer space, including its components;
- (c) “operator” means a natural or juridical person that carries out or undertakes to carry out space activity.
- (d) “competent authority” means the Department of Innovations of the Lithuanian Ministry of Economy.

Article 4. Supporting development of national space activities

(1) The competent authority shall plan and implement overall policies for the development of national space activities in conformity with space treaties concluded with other countries and international organisations.

⁵⁶ GAUBERT, C. Do Small Satellites Need Insurance? In *Small satellites: regulatory challenges and chances*. Marboe, I. (ed.). Leiden: Brill Nijhoff, 2016, p. 378.

⁵⁷ GAUBERT, C. Do Small Satellites Need Insurance? <...>, p. 379.

(2) The competent authority shall promote the development of the private space activities by providing tax benefits, financial support, procurement, partially accepting the third-party liability caused by private space activities, waiving administrative fees etc.

CHAPTER II. AUTHORISATION

Article 5. Authorisation for space activity

It is prohibited to carry out space activity without the authorisation by the competent authority.

Article 6. Conditions for authorisation

(1) The authorisation shall be issued if:

(a) the space activity is compatible with the national security, foreign policy interest and international obligation of the Republic of Lithuania;

(b) the space activity does not pose any danger to the safety of persons, property, environment, public health and public order;

(c) the operator possesses experience, expertise, technical qualifications and capability to carry out the space activity;

(d) the operator fulfils the requirements related to the mitigation of space debris according to the Article 8.

(e) the operator fulfils the insurance requirements according to the Article 7.

(f) the operator fulfils the requirements concerning orbital positions and frequency assignments.

(2) The operator shall submit the application for authorisation to the competent authority.

(3) Together with the application, the operator has to submit all necessary documents for the assessment of the conditions for authorisation.

(4) The competent authority decides on the application for authorisation no later than three months after the application has been filed.

(5) When the competent authority requires the operator to provide additional information, the above time limit shall be increased to six months.

(6) A time limit to start space activities can be attached to the authorisation.

(7) The authorisation is issued for the duration of the space activity.

Article 7. Third-party liability insurance

(1) In order to cover liability for damages caused by space objects to persons and property, the operator has an obligation to take out third-party liability insurance. The minimum amount of third-party liability insurance shall be set by an administrative decree of the competent authority with consideration of the domestic and foreign insurance markets.

(2) The competent authority may determine a lower than a minimum amount or release the operator from third-party liability insurance requirement, considering the risks connected to the space activity.

(3) If the space activities are in the public interest or if the Republic of Lithuania itself is the operator, taking out third-party liability insurance is not necessary. Space activity is in the public interest if it serves science, research or education.

Article 8. Mitigation of space debris

(1) The operator has to take measures for the mitigation of space debris in accordance with the international guidelines for the mitigation of space debris.

(2) Especially measures limiting debris released during normal operations have to be taken.

Article 9. Modification or termination of the space activity

(1) The operator must notify immediately to the competent authority all incidence which delay or render impossible to carry out the authorised space activity or which may require the modification or revocation of the authorisation.

(2) The operator must notify immediately to the competent authority the planned or imminent termination of the authorised space activity.

Article 10. Revocation and modification of the authorisation

(1) The competent authority decides to withdraw the authorisation for space activity if the conditions for authorisation are no longer complied with, if the authorisation has been obtained based on false statements or irregular means or if there are other particular reasons for it.

(2) Pending a final decision on its withdrawal, the authorisation may be withdrawn temporarily.

(3) To ensure the safety of persons and property, environment protection in outer space, the maintenance of national security and public order, the competent authority shall provide the necessary instructions to the operator whose authorisation will be withdrawn. This operator is under the obligation to follow these instructions.

Article 11. Transfer of the authorisation

The transfer of the authorisation for space activity requires the authorisation of the competent authority.

CHAPTER III. REGISTRATION**Article 12. National registry for space objects**

(1) The competent authority maintains a registry for space objects.

(2) All space objects for which the Republic of Lithuania is the launching State according to the Article 1 of the Convention on Registration of Objects Launched into Outer Space, except when another State or an international organisation has made the registration, shall be entered into this registry.

(3) The registry shall be public.

Article 13. Registration and information

(1) The information to be entered in the registry:

1. the launching State or States;
2. the designation of the space object, the registration number of the space object and the ITU frequency allocation number;
3. the date and location of launch;
4. the main orbital parameters:
 - (a) nodal period,
 - (b) inclination,
 - (c) apogee,
 - (d) perigee,
5. the general function of the space object;
6. the manufacturer of the space object;
7. the owner and operator of the space object;
8. the weblink to the official information on the space object;
9. the spacecraft which is or was used to launch the space object;
10. further information which the competent authority may determine in light of the technological state of the art and the international legal obligations or relevant decisions of international organisations.

(2) The operator must submit the information set out in paragraph 1 to the competent authority without delay after the launch of the space object.

(3) The operator shall submit all modifications relevant to the information set out under paragraph 1 without delay.

(4) The competent authority shall communicate to the Secretary General of the United Nations the information contained in paragraph 1, subparagraphs 1 to 5. The same applies concerning the information contained in paragraph 3.

(5) The competent authority may fix the amount of the duties covering the administrative costs to be paid by the operator for the authorisation and registration procedures.

CHAPTER IV. RECOURSE

Article 14. The right to recourse

In the case that the Republic of Lithuania has compensated damage caused by a space activity in accordance with international law, the State has the right of recourse in the height of the third-party liability insurance sum against the operator who has carried out that space activity, unless particular reasons tell against this.

CHAPTER V. ENFORCEMENT

Article 15. Supervision

The operators of authorised space activities are subject to supervision by the competent authority concerning matters covered by this Law. They are under the obligation to grant the organs of the competent authority access to all business premises, allow them to inspect relevant documents and provide them with information.

Article 16. Sanctions

Everyone who infringes provisions of the present Law commits an administrative offence and shall be liable to a fine.

Article 17. Decrees

The competent authority can issue administrative decrees necessary for the implementation of this Law.

CHAPTER VI. FINAL PROVISIONS

Article 18. Settlement of disputes

Disputes arising in the course of authorised space activities shall be subject to examination in the courts of the Republic of Lithuania unless otherwise provided by the international treaties to which the Republic of Lithuania is the State party.

Article 19. Entering into force

This Law enters into force on the day of its publication in the Official Journal of the Republic of Lithuania.

Conclusions

In order to fulfil international obligations under the space treaties, to ensure national security, to boost the growth of the national economy, and to raise the national standard of living through the effective use and management of space objects and the systematic promotion of national space activities, an appropriate legal regime is indispensable.

Following best practices in Europe and the world can help to avoid “reinventing the wheel” and to promote consistency in regulation across different countries which is required by the UN General Assembly Resolution 62/101 “Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects” and the Resolution 68/74 “Recommendations on national legislation relevant to the peaceful exploration and use of outer space”. The Lithuanian government should draft the legislation on national space activities and the national register of national space objects. This legislation should establish conditions for authorisation, set out supervision of space activities, cover the registration of space objects, frequency allocation, deal with liability, insurance and space debris mitigation issues. It could be a single comprehensive law or several sector-specific laws and regulations balancing both private and public interest and responding to the international environment. The space industry can develop and prosper only when the State confer substantial assistance by planning and implementing overall policies for the development of such activities. As space systems are expensive, promoting the small satellites activities, because of their reasonable costs, could be the best national space strategy. The State shall promote the development of small satellites industry by providing tax benefits, financial support, procurement, partially accepting the third-party liability caused by private space activities, purchasing private space services, waiving administrative fees, not competing with the space activities of non-governmental entities and so on. The relevant national legislation, including the laws related to copyright and patents, contracts and export should be revised or enacted. To regulate the space sector effectively, the legislator should be in contact with the industry and academia.

Consideration should be given to the further development of human potential. Investing in education and training is necessary to develop the national competence and expertise in the area of small satellite technology, space engineering, space exploration and space law.

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Small Satellites: National Regulatory Challenges

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Summary

Lithuania does not have any space legislation. It was not needed due to insufficient national space activities. The first Lithuanian satellites were used by educational institutions for non-commercial purposes. Today in Lithuania there are some private companies delivering new-generation small satellite platforms and propulsion systems for the satellite applications and services market. To promote and to assist space activities of small satellites as a national project, State regulation is needed. Also, the private space industry must be authorised and supervised by the State under Article VI of the Outer Space Treaty. Consequently, appropriate national space legislation which supports the overall growth of any space activities, including those of small satellites, is needed in Lithuania. It would encourage the participation of private sector entities in space activities in Lithuania and promote the development and application of space technology for the socio-economic benefit of the country. Following best practices in Europe and the world, the Lithuanian government should draft legislation on national space activities and the national register of national space objects. This legislation should establish conditions for authorisation, set out supervision of space activities, cover the registration of space objects, deal with liability, insurance and space debris mitigation issues.